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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,006	08/26/2003	Sai-Mun Lee	70011377-2	5926

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AGILENT TECHNOLOGIES, INC.
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EXAMINER

NADAV, ORI

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 08/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/649,006	LEE ET AL.	
	Examiner	Art Unit	
	Ori Nadav	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-7,9 and 11-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-7,9 and 11-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>2/28/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Information Disclosure Statement

The information disclosure statement filed on 07/02/2004 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered by the examiner.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-2, 5-7, 9 and 11-18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the

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application was filed, had possession of the claimed invention. The specification recites a first hollow extending from the first side of the substrate to a die and a second hollow (recess) extending from the die to the second side of the substrate. There is no support in the specification for a hollow extending from the first side of the substrate to the second side of the substrate, as recited in claim 1.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 9 and 11-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Nicewarner Jr. (5,327,325).

Nicewarner Jr. teaches in figure 3 and related text a packaging structure for a semiconductor device, comprising:

a substrate surface-mountable on a mounting surface of a circuit board, wherein the substrate 12 has a first side facing away from the mounting surface and a second side being on the same side of the structure as the mounting surface, and wherein the substrate is hollow 22, with the hollow 22 extending from the first side of the substrate 12 to the second side of the substrate;

a recess (the recess within and below resin 80) in the second side of the substrate;

a semiconductor die 26, 28 having a first side and a second side, and mounted in said recess, with the first side of the semiconductor die facing away from the mounting surface and a portion of the first side of the semiconductor die bonded to said substrate within the recess by electrically conductive bonding pads 71.

Regarding claim 2, Nicewarner Jr. teaches in figure 3 and related text a recess includes an exposed portion of the substrate facing the mounting surface and said portion of the first side of the semiconductor die is bonded to said exposed portion.

Regarding claims 9 and 11-12, Nicewarner Jr. teaches in figure 3 and related text electrical connections running from where the die is bonded to said recess to the mounting surface, wherein said semiconductor die has edges and further comprising sealant between the edges of said semiconductor die and said substrate, wherein said sealant comprises a highly viscous material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5-7 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nicewarner Jr. in view of Peterson et al. (6,674,159).

Nicewarner Jr. teach substantially the entire claimed structure, as applied to claim 1 above, except a substrate comprises first and second substrate layers.

Peterson et al. teach in figure 3A and related text a substrate comprises first 16 and second 30 substrate layers, wherein the first substrate layer having first and second opposing sides and the second substrate layer having first and second opposing sides, the first side of the first substrate layer is the first side of the substrate and the second side of the second substrate layer is the second side of the substrate, and the second side of the first substrate layer is mounted to the first side of the second substrate layer.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a substrate comprises first and second substrate layers, wherein the first substrate layer having first and second opposing sides and the second substrate layer having first and second opposing sides, the first side of the first substrate layer is the first side of the substrate and the second side of the second substrate layer is the second side of the substrate, and the second side of the first substrate layer is mounted to the first side of the second substrate layer in Nicewarner Jr.'s device, in order to provide wider choices of design to the package and to simplify the processing procedures of making the package. The combination is motivated by the teachings of Peterson et al. who point out the advantages of multi-layered substrate over bulk substrate (see columns 3-4).

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Regarding claims 6-7, prior art's device comprises a second substrate layer has inner walls defining a hollow portion extending from the first side of the second substrate layer to the second side of the second substrate layer, with the inner walls defining at least pad of said recess and said hollow, wherein the first substrate layer has a hollow portion, coincident with the hollow portion of the second substrate layer, extending from the first side of the first substrate layer to the second side of the first substrate layer; the hollow portion through the first substrate layer is smaller than the hollow portion through the second substrate layer, such that where the second side of the first substrate layer is mounted to the first side of the second substrate layer, a portion of the second side of the first substrate layer is exposed, not being covered by the first side of the second substrate layer; and the exposed portion of the first substrate layer defines at least pad of the recess.

Regarding claims 16-18, Peterson et al. teach a sensor die (column 5, lines 4-6) and a non-opaque portion mounted to the substrate on the same side of the structure as the first side of the substrate, wherein said non-opaque portion is a transparent cover 26 on the first side of the substrate. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a sensor die and a non-opaque portion mounted to the substrate on the same side of the structure as the first side of the substrate, wherein said non-opaque portion is a transparent cover on the first side of the substrate in Nicewarner Jr.'s device in order to use the device in an application

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which requires a sensor die and in order to obtain a transparent cover for the package for mounting optical components/sensors, respectively.

Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nicewarner Jr. in view of Bhagwagar (6,791,839).

Nicewarner Jr. teach substantially the entire claimed structure, as applied to claim 1 above, including an encapsulant being flush with the level of the second side of the substrate in said recess on the second side of the semiconductor die, but except a thermally conductive and electrically insulating encapsulant, wherein the encapsulant comprises a viscous material. Bhagwagar teach a thermally conductive and electrically insulating encapsulant, wherein the encapsulant comprises a viscous material.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a thermally conductive and electrically insulating encapsulant, wherein the encapsulant comprises a viscous material, in Nicewarner Jr.'s device in order to improve the sealant characteristics of the device.

Response to Arguments

Applicant argues that Nicewarner Jr. does not teach a hollow extending from the first side of the substrate to the second side of the substrate.

There is no support in the specification for a hollow extending from the first side of the substrate to the second side of the substrate, as recited in claim 1. Nicewarner

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Jr. teaches a substrate 12 having a hollow 22, wherein the hollow 22 extending from the first side of the substrate 12 to the second side of the substrate 12, as claimed.

The rest of applicant's arguments with respect to claims 1-2, 5-7, 9 and 11-18 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion


Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ori Nadav whose telephone number is 571-272-1660. The examiner can normally be reached between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Loke can be reached on 571-272-1657. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



O.N.
8/13/05

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